# Appendix F

# National Type Evaluation Technical Committee
# Weighing Sector
# October 4-6, 1999, Ottawa, Canada
# Meeting Summary

## Agenda Items



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## Carry-Over Items

### 1. Double Wide and Narrow Decks

**Background:** This item was first briefly discussed at the 1997 Sector meeting during the discussion of multiple weighing elements interfaced with a single indicator. An NTEP lab asked if an existing vehicle scale certificate applies to an installation in which two scales are placed side by side to create a "double-wide" scale. The Sector asked the SMA Technical committee to review the issue and develop test procedures for "double-wide" scales. At

its 1998 meeting, the Weighing Sector reviewed a proposed test procedure from the SMA Technical Committee and agreed that the labs should use it on an *ad hoc* basis. The Sector asked the labs to review the procedure, try the procedure if possible, and if appropriate recommend changes to the procedure. The Ohio lab conducted an evaluation and recommended modifying the procedure. Dave Quinn (Fairbanks Scales) also expressed a desire to provide input. The Sector was asked to discuss the proposed changes at its 1999 meeting. (See Appendix A-1, 2, & 3)

**Discussion:** The Sector reviewed the recommendations and the proposed procedures. Dave Quinn (Fairbanks Scales) stated that applying a Concentrated Load Capacity (CLC) rating for a "double-wide" scale is not appropriate. He feels the Handbook 44 definition for CLC is based on a four feet long and eight feet wide loading pattern, which is the loading pattern for the tandem axle of a typical highway vehicle. Mr. Quinn also noted that assigning a CLC to a "double-wide" scale that is twice the value of that for a single platform is not appropriate and testing in a pattern that is four feet in length and the width of two normal scale platforms also is not appropriate. The Sector generally agreed that the present Handbook 44 definition for CLC does not apply to "double-wide" scales.

**Conclusion:** The Sector asked the SMA Technical Committee to review the present Handbook 44 definition of CLC and, if necessary, submit a proposal that addresses the loading patterns on "double-wide" scales. The Technical Committee was also asked to propose appropriate NTEP test procedures for the loading patterns on "double-wide" scales. The Sector agreed to continue using *ad hoc* procedures for any applications received for an NTEP evaluation of a "double-wide" scale until the recommendations of the SMA Technical Committee are developed, reviewed and accepted by the Sector. Based on the recommendation of the SMA Technical Committee the Sector may determine that changes to Publications 14 are appropriate. Recommendations for changes to Handbook 44 must be submitted to the NCWM S&T Committee for adoption by the Conference.

**2. Combination Vehicle/Railway Track Scales Minimum Test Load**

**Background:** At its 1998 meeting, the Weighing Sector agreed to submit a proposal to the Specifications & Tolerances (S&T) Committee to add a note 20 to Handbook 44 Table S.6.3.a. The note requires that a combination vehicle/railway track scale be marked with both CLC and Section Capacity. The Sector noted that the minimum test load requirements in Publication 14 raise questions concerning the requirement for a combination vehicle/railway track scale. During an NTEP evaluation, vehicle scales are required to be tested to a minimum to 90 percent of CLC with known test weights. A strain load test is conducted to a minimum of 80 percent of nominal capacity. The minimum test load requirement in Publication 14 for railway track scales is 100,000 lb. If a vehicle scale submitted for NTEP evaluation has a nominal capacity of 200,000 lb with a CLC of 100,000 lb, the minimum load requirement would be 90,000 lb of known test weight. The strain load test requires a test load of at least 160,000 lb. If a railway track scale is submitted for NTEP evaluation with a nominal capacity of 400,000 lb and a section capacity of 200,000 lb, a minimum of 100,000 lb of known test weight is acceptable. The minimum strain load requirement is to place one end of the empty United States Department of Agriculture (USDA) Grain Inspection Service Packers and Stockyards Administration (GIPSA) test car on the scale and add 100,000 lb of known weight.

The Sector asked the Scale Manufacturers Association (SMA) to review the minimum amount of known test standards required in Publication 14 for the NTEP evaluation of a railway track scale. SMA submitted the following recommendation. The Sector was asked to discuss SMA's recommendations at its October 1999 meeting.

**SMA Recommendation:**

The Committee adopted a recommendation to require 90,000 lb minimum of known test weights as shown in Publication 14, Digital Electronic Scales Sections, 66 and 67. The intent is to allow using a GIPSA test car to satisfy both railway and vehicle scale test requirements. The 5 ft wheel spacing of the GIPSA test car weight mover may need to suffice for the 4 ft test pattern and dual axle spacing for the vehicle scale CLC test. The 90,000 lb minimum test weight requirement would allow evaluating vehicle scales with CLC's up to 100,000 lb. The 80,000 lb test weight would also meet the requirement in Section 1.5.3 of the AAR scale handbook for railway track scales. The GIPSA test car weight movers are capable of applying up to 100,000 lb of test weight on the rails in 10,000 lb increments. Ninety thousand pounds of these test weights are in the form of rectangular blocks of 10,000 lb each. The remaining 10,000 lb is the powered test weight mover.

**Discussion:** The Sector reviewed the SMA Technical Committee's proposal. The Sector generally agreed with the recommendation for testing the vehicle CLC on combination vehicle/railway track scales with a minimum test load of 90,000 lb. The Technical Committee's proposal did not address a change to the minimum test load requirement for railway track scales. The Sector generally agreed that a test load of 90,000 lb was not an appropriate minimum for all railway track scales, such as one submitted for NTEP evaluation with a capacity of 400 000 lb. Lou Cerny, representing the Association of American Railroads (AAR), indicated a concern that any change to the present requirement would require a change to the GIPSA test equipment. At present, it is not possible to add additional test weights to the GIPSA test cart. Some railway track scales that are submitted for NTEP evaluation, are not long enough to allow stain load testing using the GIPSA test cart and a loaded rail car. A change to the GIPSA test equipment might depend on GIPSA's receiving additional funding.
**Conclusion:** The Sector agreed to adopt the 90,000 lb minimum test weight load for the evaluating CLC's on combination vehicle/railway track scales. Lou Cerny agreed to develop a recommendation for a minimum strain load requirement. He will contact AAR members, railroad track scale manufactures, and GIPSA for assistance and input. The Sector requested a report by April 1, 2000.

**3. Weighing Elements and Indicators Not Permanently Attached Definition**

**Background:** At its 1997 meeting, the Weighing Sector decided that a proposal should be submitted to the S&T Committee to change the headings of the 3rd and 4th columns of Table S.6.3.a. to read "Indicators with CC" and "Weighing and Load-Receiving Element with CC," respectively. At the 1998 NCWM Interim Meeting, the S&T Committee rejected the proposed language and suggested that the Weighing Sector make an alternative proposal. The S&T Committee was concerned that the proposed changes would eliminate marking requirements for non-permanently attached indicators in non-NTEP states. Additionally the proposed change still did not address the concern over inconsistency in applying the requirement during NTEP evaluations. At its 1998 meeting, the Weighing Sector discussed marking requirements for elements that are not permanently attached. The Sector recognized a need to clarify or define elements that are to be "not permanently attached." The Sector asked the SMA Technical Committee and the Labs to develop a recommendation for this meeting. SMA submitted the following proposal. The NTEP laboratories met on October 3, 1999, and offered an alternative proposal requiring that all indicators be either permanently wired or have connecting plugs sealed. The Sector was asked to review the recommendations.

**SMA Recommendation:**

Clarify meaning of "Indicating elements not permanently attached to the weighing element."

The Committee adopted the position to recommend that "Indicating elements not permanently attached to the weighing element," defines those which have their own Certificates of Conformance. Rationale: This indicating element marking situation is very similar to that of load cells with their own Certificates of Conformance. Load cells with CCs are already listed in H44 Table S.6.3.a for the purpose of specifying marking requirements.

**Discussion:** The Sector reviewed the recommendations of the SMA Technical Committee and the NTEP laboratories and agreed that "permanently attached" is difficult to define. Examples of questionable devices include indicators mounted on a pedestal attached to the load receiving element or indicators bolted directly to the load receiver. The Sector also discussed indicators and load receiving elements that have electronic identification which allows the indicator to communicate with the load receiving element only if the two elements were calibrated together. The Sector also discussed the concern of non-NTEP states. The number of non-NTEP states has decreased since the Sector's last meeting, however the Sector agreed the concern is still valid. The Sector agreed that the manufacturer can determine the status of their device at the time of evaluation and the NTEP laboratory can test accordingly. Restrictions may be listed on the CC based on the device submitted for NTEP certification.

**Conclusion:** The Sector agreed to forward the following proposal to the S&T Committee to consider:

**Proposal:** Modify Handbook 44 Scales Code Table S.6.3.a. as follows.

**Table S.6.3.a.**

**Marking Requirements**

| Weighing Equipment<br><br>To be Marked With | Weighing, load-receiving , and indicating element in same housing | Indicating element not in same housing or not permanently attached to weighing and load receiving Element[1] | Weighing and load-receiving element not in same housing or not permanently attached to indicating element[1] | Load cell with CC (11) | Other equipment Or device (10) |
|---|---|---|---|---|---|
| Section Capacity (14)(20) | | X | X | | |

[1] "permanently attached" may be hard wired or secured together with a physical or elctronic seal.

4. Marking of CLC on Indicators Not Permanently Attached

**Background:** At its 1998 meeting, the Weighing Sector discussed marking requirements for Electronic Cash Registers (ECR) interfaced with scales. The Sector heard comments indicating that the requirement for marking the CLC on an indicator that is not permanently attached should be eliminated. The Sector referred the item to the SMA Technical Committee for study and recommendations. The committee submitted the following recommendation for review. The Sector was asked to review the SMA recommendations.

**SMA Recommendation:**

The Committee adopted a recommendation to retain the current requirement to mark the CLC on indicators not permanently attached to the weighing element.

**Discussion/ Conclusion:** The SMA recommendation recognized that for some systems, such as vehicle scales, the marking of CLC on the indicator is appropriate and necessary. At the time of manufacture the final application for the indicator may not be known. Marking of CLC on the indicator may be accomplished at the time of installation. The Sector discussed the SMA Technical Committee's recommendation not to change the present Handbook 44 Table S.6.3.a. requirement for the marking of CLC on an indicating element not permanently attached to a weighing and load receiving element.

The Sector agreed with the SMA Technical Committee recommendation. No further action is required.

**5. POS Receipt Format**

**Background:** At its 1998 meeting, the Weighing Sector briefly discussed the format for POS receipts. The Sector reviewed the format of several examples of supermarket receipts. That review resulted in the opinion that Publication 14 should contain some guidelines for formatting ECR receipts to insure consistent interpretation among the laboratories. The Sector agreed to review the checklist to determine what, if any, changes are needed in Publication 14 to give the laboratories and manufacturers clear requirements for printed receipts. If needed, the Sector agreed to add examples to the checklist. Dennis Krueger (NCR) agreed to contact the Food Marketing Institute (FMI) to ask for assistance developing criteria for receipts. Mr. Krueger thought that the FMI might form a work group to develop a recommendation. Mr. Krueger was asked to update the group on progress made to date.

**Discussion:** Dennis Krueger informed the Sector that he has been unable to work on this issue, but he has recently contacted FMI. FMI is interested in working with the Sector to develop recommendations for a receipt format for POS systems. Some members of the Sector expressed an opinion that this issue belongs with the L&R Committee. Most format issues are related to providing information to the consumer that is clear, complete, and does not facilitate fraud. It was pointed out that even if some of the issues are the L&R Committee's responsibility, this Sector and the S&T Committee should discuss and resolve any device related issues.

**Conclusion:** Dennis Krueger volunteered to continue to work on this issue. He agreed to provide a proposal by April 1, 2000, for the entire Sector to consider. The Sector also agreed it is appropriate for the technical advisor to inform the L&R technical advisor of the discussions and provide input to the L&R Committee on technical issues if the L&R Committee begins to develop a proposal for a receipt format.

**6. Calibration Period for Test Weights used for NTEP Evaluations**

**Background:** The required calibration period for "Certified Test Weights" differs among the various States. The NTEP Laboratories are sometimes uncertain if the test weights available for NTEP field evaluations have a "calibration certificate" that is consistent with local requirements or if calibration is overdue. There are also questions concerning an acceptable time period between calibrations. At its 1998 meeting, the Sector asked the NTEP Laboratories to develop a proposal for calibration requirements for test weights used during an NTEP evaluation. Dick Suiter (NIST), Technical Advisor, will update the Sector on the status of the proposal.

**Discussion**: Dick Suiter updated the group on work that Georgia Harris (NIST) is doing with the state metrology labs to develop standards for calibration periods. Some jurisdictions use an annual calibration requirement. Some jurisdictions require two- and three-year intervals. At least two jurisdictions set calibration intervals for each standard based on a history developed for that standard.

**Conclusion:** The Sector agreed that consistent requirement are needed for use during NTEO evaluations. The Sector also agreed that until a calibration interval recommendation is presented by Georgia Harris and the state metrology laboratories, the NTEP laboratories should continue to apply the requirements of the jurisdiction where an evaluation is being conducted.

## New Items

**7. Modular Scale Section Connection Points**

**Source:** NIST/OWM

**Background:** NTEP was asked if there is a metrological or structural difference between devices with modules that are welding together and modules that are bolted together. Specifically, NTEP was asked, "if a device was evaluated with welded joints and received a CC, could the same device with bolted joints be covered by the same CC?"

**Recommendation:** The Sector was asked to discuss the issue and recommend a policy to be added to Publication 14 to cover future evaluations.

**Discussion:** The Sector discussed the issue with varying opinions whether or not the type of connection is metrologically significant. The Sector agreed that a bigger question is what constitutes a modular design. The Sector also discussed the location of load cells in modular designs as presented in Agenda Item 8. The Sector agreed that manufacturers are responsible for reporting design changes from their original submission for evaluation; however, no clear decision was made concerning the metrological significance of the connection or the placement of load cells.

**Conclusion:** The Sector agreed that the SMA Technical Committee should be asked to review this item and propose a definition for "modular designs." The Technical Committee is also asked to provide guidance about the metrological significance of the types of connections. The Sector will consider the SMA recommendation at its next meeting.

**8. Load Cell Placement in Modular Scales**

**Source:** NIST/OWM

**Background:** NTEP was asked if the placement of load cells under the connection point for modules is metrologically or structurally significant. Some designs have the cells placed directly under the joint. Other designs have the cells displaced to one side of the joint.

**Recommendation:** The Sector was asked to consider the issue and address the following questions: Should the location of the cells be noted on the CC? Should the test procedures be modified to consider cell placement?

**Discussion:** This item was discussed along with item 7 above.

**Conclusion:** The Sector agreed to ask the SMA Technical Committee to address this item along with item 7 dealing with the metrological significance of different types of connections (welded vs bolted) for modular scales. The Technical Committee is also asked to consider if the position of the load cells relative to the module connection point is metrologically significant. The Sector will consider the SMA recommendation at its next meeting.

**9. Models to be Submitted for Testing when a Digital Option is Added to a CC for Cells Evaluated as an Analog Design**

**Source:** NIST/OWM

**Background:** NTEP received an application to add the option of digital output to a CC for a family of load cells that were previously evaluated with analog output. NETP, in consultation with the NIST Force Group, made an *ad hoc* decision to consider this as the relocation of the A/D conversion. NTEP and the NIST Force Group also determined which cells the manufacturer needed to submit for test based on previous test data and input from technical experts.

**Recommendation:** The Sector was asked to consider this item for future applications and provide guidance concerning the appropriate level of testing.

**Discussion/Conclusion: The** Sector discussed the appropriateness of adding a digital option to a family of load cells covered by a single CC with a limited number of additional cells submitted for testing. The Sector generally agreed that if the A/D conversion was located in an add-on black box, located externally from the load cell, the black box would require full NTEP evaluation and a separate CC. If the A/D conversion is an internal component of the load cell, the option could be added to an existing certificate with a limited number of additional cells submitted for testing.

The Sector agreed that the addition of a digital option for a family of load cells covered by a CC is acceptable. The Sector also agreed that the testing of only one cell is appropriate if the A/D conversion board is the same and is located in the same way for all cells in the family. The Sector also agreed that if the digital load cell submitted for testing performed better than the analog load cells tested for original CC, the manufacturer could not request to have the $v_{min}$ lowered or the $n_{max}$ increased without full testing. The Sector also agreed that additional language should be added to Section D, 3, page 5-13 to clarify this position for future applications.

**10. Marking of Enter and Zero Keys on Weighing System Key Pads**

**Source:** Maryland NTEP Laboratory

**Background:** During the evaluation of a computing scale, the zero key for the scale was marked with the letter "Z" and the enter key was marked with the " ↵ " symbol.

**Recommendation:** The Sector was asked to provide input concerning the acceptability of these markings.

**Discussion/Conclusion: The** Sector generally agreed that the " ↵ " symbol is commonly used for the enter key and should be accepted. The use of "Z" alone to designate the zero key is not clear unless it is defined elsewhere on the device.

The Sector agreed that the " ↵ " symbol is acceptable and should be added to the list of acceptable markings in Publication 14. A notation should be added to Publication 14 stating that using the letter "Z" to designate the zero key is only acceptable if the term is also defined on the device.

**11. Ranges Covered on the CC for a Railway Track Scale Based on the Device Evaluated**

**Source:** NIST/OWM

**Background:** Section B.5. of Pub 14, Digital Electronic Scales, gives a range of parameters which can be covered on a CC for weighing elements greater than 30 000 lb capacity based on the model evaluated. If a vehicle scale with a nominal capacity of 160 000 lb is evaluated the manufacturer may request the CC include capacities up to 216 000 lb. In the case of railway track scales, 135 percent of the capacity evaluated may be a substantial change. For example, a scale submitted with a capacity of 400 000 lb could be used to cover devices with a capacity up to 540 000 lb.

**Recommendation:** The Sector should consider whether or not applying this criteria to railway track scales or placing a limit on the allowable amount of increase is appropriate.

**Discussion/ Conclusion:** Some members of the Sector suggested that the 135 percent criteria is as appropriate for railway track scale as it is for vehicle scales. Railway track scales are designed for heavier loads than vehicle scales. A suggestion was made and the Sector agreed to re-address this issue once the minimum strain load requirement for a railway track scale evaluation is established.

The Sector agreed to re-address this issue when the minimum strain load requirement for NTEP evaluation of a railway track scale is resolved.

**12. Application of Modular Criteria to Combination Vehicle/Railway Track Scales**

**Source:** NIST/OWM

**Background:** Section B.6. of Pub 14, Digital Electronic Scales gives range parameters for modular load-cell vehicle scales. Manufacturers of combination vehicle/railway track scales submitted for NTEP evaluation have requested that the CC cover the same range of parameters. If those manufacturers verify that the device submitted is a modular design, and the subsequent NTEP evaluation included the test criteria for modular designs, it seems appropriate to apply the same criteria to [modular] combination vehicle/railway track scales and railway track scales.

**Recommendation:** Remove the word "vehicle" from the title and change all references to "CLC" to "CLC or Section Capacity," thus making the paragraphs applicable to all modular scales.

**Discussion/Conclusion:** The Sector discussed the appropriateness of applying modular criteria to railway track scales. The Sector generally agreed that the definition of modular designs (as outline in Agenda Items 7&8) should be resolved before this item is decided.

The Sector agreed to revisit this item at its next meeting after the SMA Technical Committee submits a proposal to clarify the definition of a modular scale.

**13. CLC on Livestock Scales**

**Source:** NIST/OWM

**Background:** Handbook 44 requires that livestock scales be marked with a CLC. It may be appropriate to test a livestock scale to see how it performs with a load concentrated on the platform. It also seems appropriate to require a marking which limits concentrated loads.

The Handbook 44 definition for CLC only explains how the term CLC applies to a vehicle scale. Handbook 44 does not give any guidance about how the term CLC applies to a livestock scales. When the CLC definition was developed many livestock scales were a derivation of a vehicle scale design. Now some NTEP applications are exclusively for the weighing of livestock, such as livestock ring scales, animal scales, or portable livestock scales.

In actual use, the loads on a livestock scale are randomly distributed depending on the number of animals being weighed. A full load will generally be distributed over the entire platform. If only a small number of animals are being weighed, the animals may crowd into one corner. When a vehicle scale is in actual use, the loads typically follow a wheel spread of eight feet wide and depend more on the vehicle's footprint.

The basis for CLC on a vehicle scale was derived from the highway bridge formula which allows a tandem axle to be loaded to a maximum of 34 000 lb. For a livestock scale, the USDA Packers and Stockyards Administration requires that the maximum load that can be placed on the platform should be based on 110 lb per square foot of platform area.

**Recommendation:** The Sector should consider if the requirement for marking CLC on a livestock scale is appropriate or if CLC should be redefined when applied to livestock scales.

**Discussion/Conclusion:** The Sector generally agreed that the CLC test criteria currently in Publication 14 should apply to livestock scales. However, the Sector recognized that the discussions during the development of the CLC definition centered primarily on vehicle scales. The Sector agreed that Handbook 44 and Publication 14 should be changed to eliminate the requirement for marking and testing of CLC on livestock scales. The Sector did not develop a specific proposal at this meeting. The Sector agreed that will develop a proposal, with input from GIPSA, to replace the Handbook 44 requirements for marking CLC on livestock scales with concentrated load marking and test criteria based on the P&S loading formula of platform area times 110 lb per square foot. will also develop a proposal, with input from GIPSA, for test criteria to be added to Publication 14 for livestock scales based on the proposed changes to Handbook 44.

The Sector agreed to revisit this item at its next meeting.

**14. Minimum Height for Weight Indication on Video Display Screens Used as Indicators**

**Source:** Maryland NTEP Laboratory

**Background:** The Maryland NTEP Laboratory evaluated a software based ECR in which the primary weight display was incorporated into a corner of the Cathode Ray Tube (CRT) display screen. The lab was concerned about the height of the characters. The total display area was approximately 12mm high. The character size of the weight indication was approximately 4 mm high. The laboratory felt that the height of the letters did not provide clear and legible indication of the weight display. While Handbook 44 and Publication 14 have general requirements about the visibility and legibility of indications neither have specific requirements for the character size for indications for scales. OIML R76-1 Nonautomatic Weighing Instruments has a minimum height requirement for display characters of 10 mm ± 0.5 mm.

At its last meeting, the NTEP Laboratories agreed to submit a proposal for a minimum height requirement of 10 mm ± 0.5 mm. The laboratories believe that requiring a specific minimum height (as is currently done in the Grain Moisture Code of Handbook 44) will help to ensure consistent application of the requirements. Andrea Buie (MD) and Steve Cook (CA) agreed to draft a proposal to present to the Weighing Sector. That proposal is included in the following recommendation.

**Recommendation:** The Sector was asked to consider the following proposal for addition to NIST Handbook 44. If the Sector agrees with the proposal, it will be forwarded to the S&T Committee.

S.1.1.1. Digital Indicating Elements. –

(a) A digital zero indication shall represent a balance conditions that is within ±1/2 the value of the scale division.

(b) A *digital indicating device shall either automatically maintain a "center-of-zero" condition to ±1/4 scale division or less, or have an auxiliary or supplemental "center-of-zero" indicator that defines a zero-balance condition to ±1/4 of a scale division or less. [Nonretroactive as of January1, 1993.] (*Amended 1992)

*Primary weight indications on both the operator and customer side shall be clear, of the same dimension, and at least 10 mm in height. [Nonretroactive as of January 1, 200X]*

**Discussion:** The Sector discussed the proposal. Several members stated that a minimum height requirement should only apply to devices used in directs sales and only on the customer side. Other members indicated any proposal should be compatible with OIML requirements. It was noted that the OIML minimum size requirement of "10 mm ± 0.5 mm" may change to "9.5 mm on the customer side." It was also generally agreed that all information displayed by ECR's except measuring units should be exempt from minimum size requirements. When an ECR is used the customer is provided a receipt. The Sector agreed that a General Code requirement would be more appropriate than a specific code requirement.

**Conclusion:** The Sector agreed that the following proposal should be forwarded to the S&T Committee for additional language to be added to Handbook 44, General Code, Paragraph G-S.5.2.3.

*Modify G-S.5.2.3. as follows.*

G-S.5.2.3. Size and Character

(a) In any series of graduation, indications, or recorded representations, corresponding graduations and units shall be uniform in size and character. Graduations, indications, or recorded representations that are subordinate to or of a lesser value than others with which they are associated shall be appropriately portrayed or designated.
**[** Made retroactive as of January 1, 1975.**]**

(b) *Except for ECR's on direct sale digital devices that display primary indications the numerical figures of the primary indications on the customer side must be at least 9.5mm in height. [Nonretroactive as of January 1, 200X.]*

(c) *For ECR's the display of the measurement units must be at least 9.5mm in height. [Nonretroactive as of January 1, 200X.]*

**15. Scales to be Submitted for Evaluation When the Range of Capacities is Narrow.**

**Source:** Maryland NTEP Laboratory

**Background:** At its 1997 meeting, the Weighing Sector decided that the general policy of applying 4:1 from extremes of the family capacity and 10:1 overall ratios was acceptable for defining which device(s) must be submitted for evaluation in order to cover a family of scales with a capacity of less than 30,000 lb. At its 1998 meeting, the Sector re-affirmed the 1997 decision and suggested the labs continue to monitor the issue. The Maryland NTEP Laboratory is concerned with the policy of evaluating only a mid-range device when the range of capacities is narrow. They have found several instances where subsequent submissions at a higher or lower capacity have failed environmental testing. At the last NTEP Laboratory meeting, the Maryland laboratory agreed to supply data supporting their concern. The Sector is asked to review that data and decide if the current policy should be changed.

**Series Tests (1992-1999)**

If the current policy was utilized during the period of 1992 - 1999, eight out of twelve NTEP Certificates of Conformance issued from this laboratory would have contained a device that did not comply with NIST Handbook 44.

| Evaluation Number | Capacity Range | Pass/ Fail(Tolerance) | | | Comments |
|---|---|---|---|---|---|
| | | Low | Mid | High | |
| 1 | 15 to 30 lb | P | n/a | F | Device failed at 30 x 0.1 lb. Capacity reduced to 15 x 0.1 lb |
| 2 | 1K to 10K | F | P | P | 1000 x 0.5, 2000 x 1, 4000 x 2, 10000 x 5 |
| 3 | 150 lb to 300 lb | P | n/a | F | Failed influence factors test |
| 4 | 250 lb to 1000 lb | F | P | P | 250 x 0.1, 500 x 0.2, 1000 x 0.5 |
| 5 | 30 lb to 300 lb | P | n/a | P | 30 x 0.01, 60 x 0.02, 150 x 0.05, 300 x 0.1 |
| 6 | 150 lb to 200 lb | n/a | *P | F | *Multi-Interval and single range devices. Largest Capacity and Smallest d tested |
| 7 | 1K to 5K | F | n/a | P | 5000 d |
| 8 | 1K to 10 K | P | n/a | P | |
| 9 | 25 lb to 500 lb | P | P | P | |
| 10 | 15K to 25K | P | n/a | F | Originally tested as 25K. Failed at 25K and 20K. Passed at 15K |
| 11 | 15 lb to 30 lb | F | n/a | P | 15 x 0.01 and 30 x 0.01. 15 lb failed influence factors test. |
| 12 | 20 lb to 40 lb | P | n/a | P | |
| Totals | Failed | 4 | 0 | 4 | |
| | Passed | 7 | 4 | 8 | |

Eight of the twelve(67%) evaluations failed because devices on the low or high end of the capacity range failed to meet accuracy

**Discussion:** The Sector reviewed the above data from the Maryland laboratory as well as additional information from other NTEP laboratories. The laboratories found problems with testing only a mid-range device for a range of capacities meeting the over-all range of 10:1 and a range of 4:1 from either extreme. The Sector agreed that the range of capacities to be covered by the evaluation of a mid-range device should be reduced.

**Conclusion:** The Sector agreed to modify the footnote on page 1-9 of Publication 14, Digital Electronic Scales to stipulate that a narrow range must be less than 2:1 otherwise both the highest and lowest capacity must be tested. The criteria will also apply to subsets of the entire range of a family to be covered by one CC.

*Modify the footnote on page 1-9 of Publication 14 as follows.*

[1]If the range of capacities is quite narrow (e.g., 50 lb, 110 lb, and 200 lb) and is a ratio of less than 2:1 it may be that only a device near mid-range need be submitted. If the range of capacities is extremely wide (e.g., 10 lb to 10 000 lb) it may be necessary that a device near mid-range also be submitted.

Example: For a family of scales with a range of capacities from 500 lb to 999 lb the manufacturer could submit one model with a capacity of 750 lb. If the 750-lb model successfully passed full evaluation the entire family could be covered by the CC. If the range for a family included capacities from 10 lb to 100 lb, the manufacturer would be required to submit three devices. The devices required to be submitted for evaluation would include the highest and lowest capacity as well as one near mid-range.

**16. Marking Requirements for Hardware of Software Based Systems**

**Source: Maryland NTEP Laboratory & NIST**

**Background:** NIST/OWM and the NTEP laboratories have been concerned about marking requirements for the hardware of software-based weighing systems. One of the NTEP laboratories evaluated an ECR software program with a remote primary weight indicator feature. The feature allows any off-the-shelf monitor to be used as the primary weight display. The company marked the required identification information on tamper evident labels. These labels will be placed on the PC's monitor during software installation. If the monitor malfunctions and is replaced, the display is still the same, but its permanent markings are gone. If the user changes programs, the markings are permanent, but the display may function differently. The evaluator believes that the best way to mark these devices is on the CRT screen real time as part of the display. At the last NTEP meeting, the labs were asked to discuss the issue with the goal of presenting a proposal to the Weighing Sector. Steve Cook (CA) and Andrea Buie (MD) agreed to develop a proposal for submittal to the Sector.

**Recommendation:** The Sector was asked to consider the following proposal for addition to NIST Handbook 44. If the Sector agrees, the proposal will be forwarded to the S&T Committee.

> G-S.1. Identification. – All equipment, except weights and separate parts necessary to the measurement process but not having any metrological effect, and software-based weighing and measuring systems that are capable of operating on equipment not provided by the manufacturer or distributor shall be clearly and permanently marked for the purpose of identification with the following information:
>
> (a) the name, initials, or trademark of the manufacturer or distributor;
> (b) a model designation that positively identifies the pattern or design of the device;
> *(c) except for equipment with no moving or electronic component parts, a nonrepetitive serial number; and [Nonretroactive as of January 1, 1968]*
> *(d) the serial number shall be prefaced by words, an abbreviation, or symbol, that clearly identifies the number as the required serial number. [Nonretroactive as of January 1, 1986]*
> *(e) Weighing and measuring systems that are capable of operating on equipment not provided by the manufacturer shall have the required identification continuously displayed on the primary indicating element during normal usage.*

**Discussion:** The Sector discussed this item at length. Most members agreed that indicators must be marked with the information required in G-S.1. Problems arise when the indicator is a CRT or other type of Personal Computer (PC) monitor manufactured by a company other than the manufacturer holding the CC for the system. The questions that were discussed include: Which manufacturers name(s) should be on the monitor? Are the markings permanent? Who is responsible for the required markings if the monitor is changed? Is it acceptable to display the required markings on the monitor screen? If the markings are displayed on the screen, must they be available at all times? For systems that are software based, is a version number more meaningful than a serial number? Does this only apply to POS systems? Some members felt that marking the CC number on the indicator would solve the problem. Another member pointed out that two completely different versions may have the same certificate number. The hardware may look identical; however, the operation and features may not be the same. One member pointed out that a real-time screen display of marking information would eventually burn that portion of the screen. There was general agreement that many of the questions also apply to G-S.6. and S.6.3.

**Conclusion:** The Sector did not reach a consensus on this item. The Sector agreed that this is an S&T Committee issue. If it is added to the S&T Committee agenda members should provide input and comments directly to the S&T Committee.

**17. Standard Features and Options to be Listed on a CC**

**Source:** Maryland NTEP Laboratory

**Background:** The Maryland Laboratory is concerned that some Certificates of Conformance list nonmetrological features and options that have not been evaluated by an NTEP Laboratory. At the last NTEP Laboratory meeting the laboratories generally agreed that if features and options were not evaluated they should not be listed as standard features and options. Andrea Buie (MD) agreed to draft a proposal for the Weighing Sector.

**Proposal:** Add the following language to Publication 14, NTEP Technical Policy for Scales, Section A. & B.

**A. Models to be Submitted for Evaluation**

A type is a model or models of the same design, as defined in the NTEP Policy and Procedures. A complete list and description of all models of a type to be included on the CC (CC) shall be submitted with the request for type evaluation. All options and features to be included on the CC must be submitted for evaluation. If the CC is to include more than one model of the same type, the submitter shall contact the evaluation agency to determine which model or models will be evaluated. A CC will be amended when new models of the same type meeting the specified criteria are added by the manufacturer. *Nonmetrological features may be listed on a CC, but only if the feature has been tested and operates properly.*

**B. CC Parameters**

The following guidelines apply.

**1. Indicating Element**

A CC will apply to all models that have:

a. equivalent hardware and software
b. the same or smaller number of scale divisions
c. subsets of standard options and features of the equipment evaluated.

Metrological features not recognized by Handbook 44, but capable of being used as the basis for commercial transactions, shall be capable of being disabled before the device can receive an NTEP CC.

*The following units of measure are not recognized in Handbook 44: tael, tical, & momme. Listing these units on a CC would appear to indicate that they meet the applicable requirements of Handbook 44 and are acceptable for use in commercial applications.*

**Discussion:** The Sector generally agreed that the standard features and options listed on page one of a CC should be metrological functions that were evaluated. Listing additional units of measure that are not used in the U.S. can benefit the manufacturer of the device. Some devices submitted for NTEP are also sold in other countries. In some of those countries, the NTEP CC may aid the manufacturer in being allowed to distribute the device. During NTEP evaluation units of measure which are not recognized in Handbook 44 may not be subjected to full evaluation. However, the evaluation laboratory may check at several points for proper conversion from the units of measure being evaluated to other units of measure to be listed on the CC. There also may be exceptions for non-commercial features. An example would be a NTEP scale with a non-commercial counting feature that may be listed on the certificate. Some members were also concerned about devices other than scales, such as grain analyzers that will perform non-commercial measurements for starch and oil content. Some members thought that features that had not been evaluated should be listed on page two of the certificate.

**Conclusion:** The Sector agreed to carry this item forward to its next meeting to allow for further development of the issue. There was concern that all types of devices should be considered. Other Sectors may also need to provide input.

**18 (a). Re-evaluating Test Data to Cover Smaller "d" and Larger "n"**

**Source:** Maryland NTEP Laboratory

**Background:** At the last NTEP Laboratory meeting, the Maryland Laboratory expressed concern with the practice of re-analyzing data from the evaluation of a scale when a manufacturer requests a smaller division size and a larger number of divisions on a CC than the original request. This practice is similar to the re-analyzing of load cell test data to allow the CC to list a lower $v_{min}$ than stated on the application for a certificate. For some time NTEP has allowed load cell manufacturers to request the NIST Force Group to re-analyze load cell data. The labs agreed that criteria and procedures should be added to Pub 14 stipulating when and how this practice is acceptable for complete devices.

**Recommendation:** The Sector should consider the following proposal. If the Sector agrees, the proposed language will be added to Section 58, Digital Scales of Publication 14.

Proposed language for addition to Publication 14, Section 58, Digital Electronic Scales

58.19 If the Device Under Test (DUT) fails to meet tolerance requirements while conducting steps 58.13 and 58.17, the manufacturer may have the option to have the test data reanalyzed for a larger "$e_{min}$" and smaller "$n_{max}$". Re-analyzing data is only appropriate if the data was collected using error weights or expanded display resolution to a resolution of one tenth of the specified "$e_{min}$".

58.20 If the DUT fails to meet tolerance requirements while conducting steps 58.13 and 58.17, the manufacturer has the option of specifying a smaller temperature range. If the DUT failed at only the original specified

minimum or maximum, only the new specified minimum or maximum must be tested, the DUT is not required to be re-tested over the entire new specified temperature range.

58.21 Before manufacturers request a smaller "$e_{min}$" and/or larger "$n_{max}$" based on the performance during an evaluation, they must submit documentation illustrating the changes made to the device or the manufacturing process to improve the metrological performance of the device. NTEP reserves the right to require the submission of additional devices for temperature testing.

**Discussion:** Most Sector members agreed that device manufacturers should know how well their device will perform at the time they apply for an evaluation. If the device submitted for evaluation happens to perform better than anticipated, a manufacturer should not be allowed to request, a lower $v_{min}$ or higher $n_{max}$ than originally on the application. Canada would require manufacturers to submit another device if they wanted to increase "n" or lower the value of "e." The majority of the Sector agreed with proposed paragraphs 58.19 and 58.20. The Sector agreed that the last sentence of 58.21 should require that additional devices be tested.

**Conclusion:** The Sector approved the proposed sections 58.19 and 58.20 as written. The Sector approved paragraph 58.21 as follows.

58.21 Before manufacturers requests a smaller "$e_{min}$" and/or larger "$n_{max}$", based on the performance during an evaluation, they must submit documentation illustrating the changes made to the device or the manufacturing process, to improve the meteorological performance of the device. NTEP ~~reserves the right to~~ will require the submission of additional devices for temperature testing.

**18 (b). Re-evaluation of Test Data for Load Cells to Cover Smaller "$v_{min}$" or Larger "n"**

**Source:** NIST/OWM

**Background:** When manufacturers submit a load cell for NTEP testing, they receive a copy of the test data. Sometimes, based on the test results, the manufacturer requests that the application be modified and the test data re-analyzed for a smaller "$v_{min}$" and a larger "$n_{max}$."

**Recommendation:** The Sector should revisit this practice and consider the following proposal. If the Sector agrees, the proposed language will be added to Section K, Load Cells, of Publication 14.

Proposal for addition to Publication 14, Section K, Load Cells.

**IV. Re-analyzing performance data**

When a load cell is submitted for NTEP evaluation, testing is conducted to determine performance over the range of temperature specified by the manufacturer. If the collected data indicates that the cell would meet the performance requirements for a smaller "$v_{min}$" and/or a larger "$n_{max}$" than that specified on the NTEP application, the manufacturers may request that a CC be issued using the smaller "$v_{min}$" and/or larger "$n_{max.}$" When requesting a smaller "$v_{min}$" and/or a larger "$n_{max}$" they must submit documentation of changes made to the cell or the manufacturing process to improve the metrological performance. NTEP reserves the right to require the submission of additional cells for testing.

**Discussion:** The Sector agreed that load cells should be treated similarly to complete devices as discussed in the previous item. The same general reasons apply. The Sector agreed with the proposed Section IV, with the exception that additional testing of at least one additional cell will be required.

**Conclusion:** The Sector agreed to add Section IV. as follows.

**IV. Re-analyzing performance data**

When a load cell is submitted for NTEP evaluation, testing is conducted to determine performance over the range of temperature specified by the manufacturer. If the collected data indicates that the cell would meet the performance requirements for a smaller "$v_{min}$" and/or a larger "$n_{max}$" than that specified on the NTEP application, the manufacturer may request that a CC be issued using the smaller "$v_{min}$" and/or larger "$n_{max.}$" When requesting a smaller "$v_{min}$" and/or a larger "$n_{max}$"; the manufacturer must submit documentation of changes made to the cell or

the manufacturing process to improve the metrological performance. NTEP will require the submission of at least one additional cell for testing.

**19. Review of AWS Issues by This Sector.**

**Source:** NIST/OWM

**Background:** The Automatic Weighing System Work Group completed its assignment and will no longer meet. At its 1996 meeting the Weighing Sector agreed that it is the logical forum for reviewing any new or ongoing issues related to the AWS Checklist in Pub 14 or for technical assistance on issues related to the tentative AWS Code in Handbook 44.

**Conclusion:** This item was presented as a reminder to the Weighing Sector that AWS issues are to be discussed by this group. No Sector action was required for this item.

**20. Sealable Parameters for AWS Systems**

**Source:** Maryland NTEP Laboratory

**Background:** The AWS Work Group did not address multiple belt speeds in its work to develop the AWS Tentative Code. Several multi-interval weigh-labelers with variable belt speeds have been evaluated by NTEP. The Maryland NTEP laboratory evaluated a device with three weight ranges and three speeds. In this particular device, speed was programmed into the price look-up (PLU) code and be changed through the user menu. If a package travels across the scale at a speed that does not allow the system to capture a weight, the device will not print a label.

At the last NTEP Laboratory meeting, not all the labs agreed that belt speed should be sealed however, the labs agreed that a table of sealable parameters should be added to the AWS Checklist of Pub 14. The labs also agreed that the Weighing Sector should consider whether belt speed needed to be a sealable parameter. Andrea Buie (MD) and Bill Fishman (NY) agreed to draft a proposal for the Weighing Sector's consideration. The Sector was asked to review that proposal for addition to Publication 14.

**Discussion:** At the meeting, Andrea Buie (MD) presented the following proposal for discussion.

*Add the following to the Scales Checklist of Publication 14*

**Sealable Parameters for AWS**

Option 1:
Add belt speed to sealable parameters for weigh-labelers.

Option 2:

12. Code Reference: G-S.5.1., G-S.5.2.2., and S.1.2.

12.1 If the system is capable of operating above its rated capacity, it shall be equipped with a means to provide an audio or visual alarm when

12.1.1 The belt speed exceeds the rated scale belt speed. **Yes ☐ No ☐ NA ☐**
12.1.2 A package exceeds the weight range for the operating belt speed (applicable to variable belt speed systems) **Yes ☐ No ☐ NA ☐**

12.2 The alarm is located so it will be noticed during normal scale operation. **Yes ☐ No ☐ NA ☐**

12.3 Access to the parameters for setting the alarm limits shall be sealed. **Yes ☐ No ☐ NA ☐**

The scale belt speed alarm is:

both audio and visual _____ audio_____ visual _____

12.4 If a package is weighed at a belt speed above the rated speed of its weight range, the system must:

12.4.1 not issue a label ,or **Yes ☐ No ☐ NA☐**

12.4.2 provide a clear indication on the printed label that the weight is invalid.
**Yes ☐ No ☐ NA ☐**

The Sector discussed the labs' proposal. One member indicated that only the maximum speed and maximum weight
should be require for marking and evaluation. The Sector was generally opposed to Option 1. Belt speed should be selectable by the user similar to tare. On many systems, the user will adjust the belt speed relative to the size of the packages. During evaluation, NTEP should verify accuracy of the device at a maximum speed and weight. There may be multiple speed ranges on some devices related to the maximum weight capacity for that range.

The Sector generally agreed with option 2. It was noted that "equipped with a means to provide an alarm" may not require an alarm to actually be installed. The Sector agreed that 12.1 should be changed from "shall be equipped with a means to provide" to "shall provide." The Sector also agreed that a manufacturer should have the option of indicating invalid weights either on the printed label or on the device.

**Conclusion:** The Sector agreed that option 2 to should be modified and added to Publication 14.

12. Code Reference: G-S.5.1., G-S.5.2.2., and S.1.2.

12.1 If the system is capable of operating above its rated capacity, it shall provide an audio or visual alarm when

12.1.1 The belt speed exceeds the rated scale belt speed. **Yes ☐ No ☐ NA ☐**

12.1.2 A package exceeds the weight range for the operating belt speed (applicable to variable belt speed systems) **Yes ☐ No ☐ NA ☐**

12.2 The alarm is located so it will be noticed during normal scale operation.
**Yes ☐ No ☐ NA ☐**

12.3 Access to the parameters for setting the alarm limits shall be sealed. **Yes ☐ No ☐ NA ☐**

The scale belt speed alarm is:

both audio and visual _____ audio only_____ visual only _____

12.4 If a package is weighed at a belt speed above the rated speed of its weight range, the system must:

12.4.1 not issue a label, or **Yes ☐ No ☐ NA ☐**

12.4.2 provide a clear indication on the device or on the printed label that the weight is invalid.
**Yes ☐ No ☐ NA ☐**

**21. Procedure for Determining Belt Speed for an AWS System**

**Source:** Maryland NTEP Laboratory

**Background:** At the last NTEP Laboratory meeting, the labs agreed that a procedure to determine belt speed should be added to the AWS Checklist of Publication 14. Andrea Buie (MD) and Bill Fishman (NY) agreed to draft a proposal for the Weighing Sector's consideration. The Sector was asked to consider adding the following procedure to Publication 14.

**Proposed Changes to Publication 14:**

**Methods for Determining AWS Belt Speed**

Laboratory Procedures

1. Optical Tachometer Method:
(To be developed by the labs at a later date.)

2. Stopwatch and Tape Measure Method:
Determine the length (one full revolution) of the scale belt in meters. Mark the edge of the belt and determine the time (to within one $100^{th}$ second) for a minimum of 20 revolutions of the scale belt.

The scale belt speed = (L x R)/T,
where L = length of the scale belt (one full revolution)
R = the number of revolutions (from the first full revolution)
T = the total elapsed time

Belt speed shall be determined in the laboratory to the nearest 0.001 m/s.

The maximum allowable error using this method, under laboratory conditions, is +/- 2%.

2.1 The belt speed, determined in the lab, equals or exceeds the marked belt speed +/- 2 %?
**Yes□No□ N/A□**

**Discussion:** Several members indicated that an optical tachometer is probably more accurate than using a stopwatch even if the tachometer did not have a certificate of traceability. One member stated that belt speed should only be measured once the system reaches optimum speed. This could require as many as 50 revolutions on a long belt. One member noted that the uncertainty in the method used to determine belt speed is not critical. A speed measurement accuracy within 10 percent of actual speed may be acceptable.

**Conclusion:** The Sector agreed that the proposed stopwatch and tape procedure should be added to Publication 14 as follows. The NTEP laboratories should continue to develop the optical tachometer method and submit a proposal to the Sector for consideration.

**Methods for Determining AWS Belt Speed**

Laboratory Procedures

1. Optical Tachometer method. (This section is under development.)

2. Stopwatch and Tape Measure Method:
Determine the length (one full revolution) of the scale belt in meters. Mark the edge of the belt and determine the time (to within one $100^{th}$ second) for a minimum of 20 revolutions of the scale belt.

The scale belt speed = (L x R)/T,
where L = length of the scale belt (one full revolution)
R = the number of revolutions (from the first full revolution)
T = the total elapsed time

Belt speed shall be determined in the laboratory to the nearest 0.001 m/s (0.01 m/min.).
The maximum allowable error using this method, under laboratory conditions, is +/- 2%.

2.1 The belt speed, determined in the lab, equals or exceeds the marked belt speed +/- 2%?
**Yes □ No □ N/A □**

**22. Test Criteria for Semi-automatic Zero**

**Source:** Maryland NTEP Laboratory

**Background:** At the last NTEP Laboratory meeting, the Maryland lab requested a review of the Measurement Canada Test Method 1-3 for LG-15.03. Canada Test Method 1-3 for LG-15.03 allows a scale to zero up to 4% of scale capacity without reducing the total capacity of the device. OIML R76 limits the effect of zero-setting and zero-tracking mechanisms to 4% of scale capacity. After that review, the labs agreed to recommend that the Weighing Sector forward a proposal to the S&T Committee to update Handbook 44 to bring it into harmony with OIML and Measurement Canada requirements.

**Recommendation:** The Sector was asked to review the following proposal and consider forwarding the proposal to the S&T Committee.

**Add the following paragraph to NIST Handbook 44, 2.20 Scales, S.2.1. Zero-Load Adjustment:**

> S.2.1.X. Range of Zero-Setting Mechanisms
>
> The overall range of a semiautomatic zero-setting mechanism and an automatic zero-tracking mechanism shall not exceed 4 percent of the maximum device capacity, unless the maximum gross load that can be weighed is decreased by an amount equal to or greater than the amount in excess of 4 percent of the maximum capacity adjusted by either mechanism.

**Discussion:** One member recalled that when the mutual recognition program was being established with Canada, this specific requirement could not be harmonized. There were comments that the proposed change might limit the usable capacity of some longer vehicle scales.

**Conclusion:** The Sector was somewhat divided on forwarding this item to the S&T committee or carrying it over to the next meeting allowing for additional study. The Sector voted to carry the item over by a vote of 8 to 4 and asked the SMA Technical Committee to provide feedback on the item prior to the next Sector meeting.

**23. Indicators with Option for Multiple Load Receiving Elements**

**Source:** NIST/OWM

**Background:** During several recent NTEP evaluations, manufacturers have installed a single load receiving element with an indicator that has the capability of displaying the weight values from more than one load receiving element; this results in a system that can indicate with more than one range where each range has a different value for "d." There is some concern that a vehicle scale could be installed in the field with this configuration. At the last NTEP Laboratory meeting, the labs agreed that if an indicator that is capable of displaying the weight value for more than one load receiving element is installed with a single load receiving element, the system should be equipped with a sealable means to prevent the use of this option in a fraudulent manner. The labs agreed that the option of displaying multiple load receiving elements should be added to the list of sealable features in publication 14. They also agreed to develop a proposal for changes to publication 14 and/or Handbook 44 to present to the Weighing Sector.

**Recommendation:** The labs proposed to the Sector that, the option for multiple load receiving elements be added to the list of sealable parameters on page 31 of Publication 14, Digital Electronic Scales.

**Discussion:** During the discussion, it was pointed out that, during the initial indicator setup, each platform selection would require calibration and the selection of the value of "d" for the platform. Calibration and value of "d" are both sealable parameters, so by default, multiple weighing elements may be a sealable function now without specifically being added to the list. One member stated that this could be handled through training weights and measures field inspectors. If this is to be added to Publication 14, the Sector members would like to see specific language.

**Conclusion:** The Sector agreed to carry over this item and asked that the laboratories to develop specific wording for any Handbook 44 changes to be submitted to the S&T committee.

**24. Recorded Representation of Count Items on ECR Systems**

**Source:** Maryland W&M

**Background:** Maryland W&M reported finding instances of ECR receipts with items by count expressed in a decimal format with as many as three places to the right of the decimal. At the last NTEP lab meeting, other labs indicated finding similar receipts. Paragraph 3.7 on page 9-11 of Pub 14, ECRs/Retail Motor Fuel Dispensers, states that decimal expressions of count are acceptable. The Checklist for ECRs Interfaced with Scales does not refer to using a digital format for items by count on the receipt. The Labs agreed that language should be added to Pub 14 to indicate that a decimal expression of count on the receipt from an ECR interfaced with a scale is not appropriate. Andrea Buie (MD) agreed to draft language for Sector consideration. The Sector should consider if the proposed changes to Pub 14 are appropriate. The Measuring Sector will also be asked to consider this issue at its next meeting.

**Discussion:** The Sector Technical Advisor, Dick Suiter (NIST) showed an example of 3.000 @ 3/1.00 for items being sold by count. Tom Ahrens (NIST) technical advisor to the Measuring Sector stated that the Measuring Sector reviewed this issue at its meeting on September 24-25, 1999. The manufacturers present at the Measuring Sector meeting did not think eliminating the trailing zeros would cause a problem. Dennis Krueger (NCR) stated that the problem began with ECR's in service stations. The software was written to print to a resolution of 0.001 gallon. When the system applications expanded into deli operations, the same software routines were continued. It would not be a problem for NCR; however, Mr. Krueger indicated he could not speak for other manufacturers. Other members agreed that it would not be a problem for their companies. Before the Sector proposes a change to Publication 14, Sector members agreed that other potentially affected parties should be made aware of the proposed change.

**Conclusion:** The Sector decided that the technical advisor, Dick Suiter, should develop specific language for changes to Publication 14 and a proposal for the S&T committee for changes to Handbook 44. It was agreed that a ballot should be sent to members of the Weighing Sector and the Measuring Sector once the language is developed

**25. Location of ID Information Required by H44, G-S.1. Identification**

**Source:** Ohio NTEP Laboratory, NIST

**Background:** Jim Truex (Ohio) reported that another NTEP Lab asked where the marking information required by G-S.1. was found during the evaluation of a point of sale system that had been evaluated by the Ohio lab. During field evaluation of the same model officials complained that the required markings are located behind a door. The CC for the device explains where the markings are located; however, field officials contend that, without knowing the model designation from the ID plate, they don't know which CC to try to locate. At the time of the evaluation, the Ohio Lab determined that the markings met the requirements of Handbook 44 and Pub 14 NIST/OWM concurred with this interpretation. The NCWM S&T Committee reviewed Paragraph G-S.1. in 1985 due to similar questions relating to the location of required markings on weighing elements installed in check-out stands. The Committee determined that required markings could be located under a scale platter or behind a door if no tool was required to access the markings. The Sector is asked to review paragraphs G-S.1. and G-UR.2.1.1. to determine if NTEP's previous interpretation of the requirement is correct.

**Discussion:** The Sector generally agreed that the interpretation was correct. One member suggested that a good alternative would be a simple label indicating where the marking requirements can be found.

**Conclusion:** The Sector supports the interpretation. The Sector also agreed to add a note to Publication 14 that, if required markings are behind a door or panel, the manufacturer is encouraged to put a label on the outside of the device that explains where the ID information is located. Such a marking is not required, nor does it have to meet permanence requirements.

**26. Screen Saver on Customer Information Displays**

**Source:** California NTEP Laboratory

**Background:** The manufacturer of a point of sale system contacted Steve Cook (CA) to find out "if California has a requirement that the scale live/gross weight must 'always' be displayed." Steve responded that California does not have any special requirements for screen savers. In the past, California has requested that the display be active any time an operator is logged on. If the register is inactive long enough to activate a screen saver, it must also automatically log off the operator. The Sector should consider whether requirements similar to those applied to "sleep modes" should be added to Handbook 44 and/or Pub 14 to address screen savers on point-of-sale systems and other indicators.

**Recommendation:** The Sector was asked to review the following proposal for addition to NIST Handbook 44 and consider forwarding the proposal to the S&T Committee.

**Modify Handbook 44, 2.20 Scales, S.1.1. (c) as follows:**

(c) A zero- balance condition may be indicated by other than a continuous digital zero indication, provided that an effective automatic means is provided to inhibit a weighing operation or to return to a continuous digital indication when the scale is in an out-of-balance condition. (Added 1987)

Examples of indications other than a continuous digital zero may include a scale ready enunciator, a sleep mode, or a screen saver.

**Discussion:** The Sector discussed the similarities between screen savers and a sleep mode. Dennis Krueger (NCR) stated that for some POS systems, the screen saver may function independently from the scale. The screen saver is generally in place to save the CRT. In those systems, weighing is inhibited if the scale is not on zero. Based on G-S.6., Publication 14 specifies a sleep mode option must include a legend adjacent to the display that states that the sleep mode indicates the device is on zero. A concern was indicated that if a device inhibits weighing when the device is not on zero, a legend stating that sleep mode indicates the device is on zero might be in conflict. It was generally agreed that if a screen save mode is treated the same as a sleep mode, no changes would be required to Handbook 44.

**Conclusion:** The Sector agreed that it is appropriate to treat a screen saver mode identically to a sleep mode and no change to Handbook 44 is needed. The same requirements and safeguards apply. Additional wording should be added to Publication 14 to recognize a screen saver mode as an alternative to the continuous digital display of zero. The Sector also asked the laboratories to review marking requirements for a sleep mode and to determine whether a conflict exists with the alternative to inhibit weighing if the device is not on zero.

**27. Manual Gross Weight Entries on Vehicle Scales**

**Source:** NIST/OWM

**Background:** Wes Diggs (VA) and Will Wotthlie (MD) both reported finding recent installations of vehicle scales with the ability to enter manual gross weight entries. Handbook 44 lists four instances for scales where manual gross weight entries are allowed. Vehicle scales are not included in that list. Several manufacturers of indicators have certificates with the option of manual gross weight entries. The Sector was asked to consider a proposal to add the option of manual gross weight entries to the list of sealable parameters. The Sector was also asked to consider if Section 2.20, Paragraph UR.3.9. should be modified to clearly state that vehicle scales are not allowed to have manual gross weight entries.

**Recommendation:** Add the option for manual gross weight entries on Class III/IIIL indicators to the list of sealable parameters on page 31of Publication 14, Digital Electronic Scales and forward the following proposal to the S&T Committee to consider.

**Modify Handbook 44, 2.20 Scales, UR.3.9. as Follows:**

UR.3.9. Use of Manual Gross Weight Entries. –

Manual gross weight entries are permitted for use in the following applications only: (1) in point-of-sale systems interfaced with scales when credit is being given for a weighed item; (2) when a device or system is generating labels for standard weight packages; (3) when postal scales or weight classifiers are generating manifests for packages to be picked up at a later time; and (4) on livestock scale systems that generate weight tickets to correct erroneous tickets. (Added 1992)

[Note: Vehicle scales do not meet any of the above criteria for manual gross weight entries.]

**Discussion/Conclusion:** The Sector Technical Advisor, Dick Suiter (NIST) provided background on UR.3.9. outlining the four instances when manual gross weight entries are allowed on weighing systems. Vehicle scales were clearly not intended to be included for allowance of manual gross weight entries. Several Sector members gave examples of applications where manual gross weight entries on vehicle scale systems are appropriate for correcting erroneous weight tickets similar to the allowance for livestock scales. The majority of the Sector agreed that Handbook 44 should be changed to allow for manual gross weight entries on vehicle scales. The Sector considered two options for changing Handbook 44.
Option 1 would remove the word livestock from UR.3.9. (4). Option 2 would add "and vehicle scale systems" after "livestock" in UR.3.9. (4). The Sector voted on both options. The vote on option (1) was 10 in favor, 4 opposed, 1 abstained. The vote on option (2) was 10 in favor, 1 opposed, 3 abstained.

The Sector agreed to forward both options for changing Handbook 44, UR.3.9. including the vote on the options. The Sector favors adding vehicle scales to the applications allowed to use manual gross weight entries.

**Option 1:**

**UR.3.9. Use of Manual Gross Weight Entries.** - Manual gross weight entries are permitted for use in the following applications only: (1) in point-of-sale systems interfaced with scales when credit is being given for a weighed item; (2) when a device or system is generating labels for standard weight packages; (3) when postal scales or weight classifiers are generating manifests for packages to be picked up at a later time; and (4) on ~~livestock~~ scale systems that generate weight tickets to correct erroneous tickets.
(Added 1992)

**Option 2:**

**UR.3.9. Use of Manual Gross Weight Entries.** - Manual gross weight entries are permitted for use in the following applications only: (1) in point-of-sale systems interfaced with scales when credit is being given for a weighed item; (2) when a device or system is generating labels for standard weight packages; (3) when postal scales or weight classifiers are generating manifests for packages to be picked up at a later time; and (4) on livestock *and vehicle* scale systems that generate weight tickets to correct erroneous tickets.
(Added 1992)

**28. Shift Test Pattern for Scales Based on the Number of Load Cells**

**Source:** Darrell Flocken (Mettler-Toledo)

**Background:** During a recent evaluation of a Mettler-Toledo scale, a question regarding the appropriate pattern for conducting a shift test arose. The question was resolved for that evaluation, but Darrell Flocken thought that Pub 14 should be changed to clarify the appropriate test pattern to be used for various devices when conducting a shift test. Darrell recommends that Section 55 of Pub 14 be removed and replaced with the current wording of Part 1 – General Information, Section 14 of the Measurement Canada Laboratory Manual, January 1997 edition. The Sector should consider this proposal and decide if it concurs. (A copy of the General Information, Section 14 of the Measurement Canada Laboratory Manual is available by contacting the Sector Technical Advisor, Dick Suiter [NIST].)

**Discussion:** The Sector Technical Advisor, Dick Suiter, (NIST) showed examples of current shift test patterns. Various members of the Sector provided opinions related to the appropriate shift testing of single load cell and four load cell designs. One member was concerned that the Measurement Canada Laboratory Manual provides for a shift test on hopper and tank scales; however, Publication 14 does not require a shift test on hopper and tank scales.

**Conclusion:** The Sector decided to readdress this issue at its next meeting. The Sector also asked the SMA technical committee to review the current shift test patterns and provide feedback to the Sector as to what is appropriate prior to the next Sector meeting.

**29. AAR Requirements for Railway Track Scales**

**Source:** NIST/OWM

**Background:** When the USDA Grain Inspection Packers and Stockyard Administration completes an evaluation of a railway track scale, they submit the report to NIST/OWM to draft the CC. The report indicates whether or not the device was evaluated for compliance with the Association of American Railroads (AAR) Scale Handbook as well as an indication that the device meets the requirements of the FGIS Weighing Handbook and NIST Handbook 44. The Sector is asked to consider whether or not reference to these three documents should be listed in the test conditions on a CC. The Sector may also want to consider whether or not railway track scales submitted for NTEP evaluation should be required to meet AAR design requirement. For example, a Cooper E80 rating on the weighbridge of a device submitted for NTEP evaluation might be required before a CC will be issued.

**Discussion:** Several Sector members expressed opinions that NTEP should not be concerned with the requirements of other agencies. NTEP should only evaluate for compliance with Handbook 44. Other members felt that additional requirements and information on a CC would benefit weights and measures officials and potential purchasers of equipment.

**Conclusion:** The Sector agreed that no additional statements should be added to NTEP Certificates of Conformance relative to requirements other than Handbook 44.

**30. Permanence Test Requirements for Class I Scales**

**Source:** Ohio NTEP Laboratory

**Background:** Canada requires a permanence test for class I scales. A list of devices and elements that may not require permanence testing is located on page 1-77 of Publication 14. Class I scales are included on this list. When this list was developed, some of the NTEP Laboratories did not all have the ability to do an automated permanence test on class I scales.

**Conclusion:** NTEP has designated the Ohio Laboratory for testing all class I scales. Ohio now has the capability to perform the automated permanence test. Consequently, the Sector agreed that the reference to class I scales be removed from the list of devices and elements that *may* not be subject to permanence testing.

**Location of Next Meeting:**

The Sector agreed to tentatively schedule the next meeting for September or October 2000 in Columbus, Ohio.

**1999 NTETC Weighing Sector Meeting**
**Ottawa, Ontario, Canada**
**Attendance List**

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# Appendix A-1 to
# October 1999 Weighing Sector Meeting Summary

**64 Performance and Permanence Tests for Vehicle Scales and Permanently-Installed Axle-Load Scale Weighing Elements**

*Note: Please refer to device application for vehicle scale checklist*

Performance tests are conducted to determine compliance with the tolerance and, in the case of nonautomatic indicating scales, sensitivity requirements specified in NIST Handbook 44. The tests described here apply only to the weighing element. It is assumed that the indicating element used during the test has already been examined and found to comply with the applicable requirements. If the performance of the indicating element is to be determined during the same examination, the applicable requirements for weighbeams and poises, dials, electronic digital indicators, etc., must be referenced.

64.1. Tests For Single-Wide Vehicle Scales and Permanently Installed Axle-Load Scale Weighing Elements

Initial Type Evaluation (Field) Performance Tests

The minimum amount of known test weight needed for the initial type evaluation test is equal to at least 90 percent of the concentrated load capacity of the scale. Substitution testing may be used to reach the necessary test load.

64.1.1. Indicator Tests

Beam Scales

If the indicating element is a weighbeam and poise, sensitivity tests should be conducted as follows:

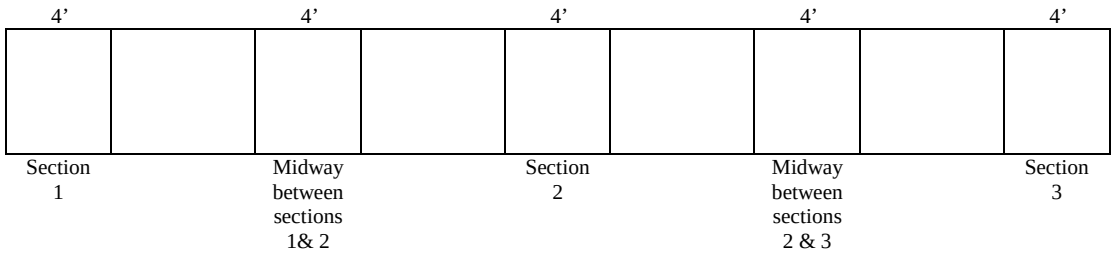
The sensitivity tests are conducted at zero load and at the maximum test load. The sensitivity test is conducted by determining the actual test weight value needed to bring the beam from a rest point at the center of the trig loop to rest points at the top and bottom of the trig loop. The maximum load applied to a scale to determine sensitivity near scale capacity does not have to be a known weight.

Digital Indicator

If the indicating element is a digital indicator, width-of-zero tests, zone of uncertainty tests, and appropriate tests for the automatic zero-setting mechanism (if so equipped) should be conducted as indicated in other sections of this document.

64.1.2. Shift Tests

64.1.3. An example of the four-section scale:




64.1.3.1. At least two complete sets of shift tests shall be conducted over each section to at least 90 percent of the concentrated load capacity (CLC) of the scale. This is to determine the repeatability of the scale. The scale error should be determined at a minimum of five equally spaced test loads. Scale errors may be determined at more

points if desired. If two weight carts are used, they should travel along the paths the wheels of a vehicle would take when moving across the scale. Decreasing load tests are to be avoided when testing a section. A truck may not be backed onto the scale in order to place weights on the inner sections. Decreasing load tests shall be conducted after the sections have been tested to their maximum load and the weights are being removed from the scale. Do not exceed the CLC capacity. The load is to be distributed across the section.

64.1.3.2. At least one complete set of shift tests to at least 90 percent of the CLC shall be conducted at mid- span between sections.

64.1.3.3. If a scale consists of modules that are connected together to comprise the weighbridge, shift tests shall be conducted by placing the load so that it straddles the connection between the modules. Later, at least one shift test is to be conducted on the scale with the test load is placed first on one side of the connection line of the module, then on the other side of the connection line.

64.1.3.4. The results of shift tests are required to agree within the absolute value of the applicable maintenance tolerances and must be within acceptance tolerances

64.1.4. Strain Load Test

64.1.4.1. At least one strain load test shall be conducted at each end of the scale. The maximum load applied during the strain load shall be in the range of 80 to 100 percent of scale capacity. The load is to be distributed over the load receiving element.

64.1.4.2. Load the scale with a vehicle or vehicles so the addition of test weights will provide a gross load of 80 percent to 100 percent of scale capacity. Determine the "reference point" for the start of the strain load test. Add the test weights to one of the ends of the scale without exceeding the CLC.

64.1.4.3 Do not conduct a decreasing load test or a return to the strain load reference weight as part of this particular strain load test. After removing the test weights from the end of the scale, reestablish the strain load reference value and reapply the test weights to verify that the strain load values repeat the initial values. Conduct a decreasing load test and return to the strain load reference value as the weights are removed as part of this test cycle. The return to the strain load reference value shall be within one-half of a scale division with consideration given for the creep and for any temperature changes that may have occurred during this last test cycle.

64.1.4.4. Remove the known test weights and the strain load. Zero the scale, place the strain load on the other end of the scale, and establish the strain load reference value. Do not use the zero-setting mechanism to set the strain load to zero; the tare mechanism may be used to tare out the strain load. The gross load zero value is needed to conduct a decreasing load test as the strain load is removed in the next test.

64.1.4.5. Repeat the strain load test on the other end of the scale. After reaching the maximum test load for the strain load test, remove the strain load but leave the known test weights on the scale. The weight indication for the decreasing load test must be within tolerance for the known test load. Continue the decreasing load test by removing the known test weights. Take several readings as the weights are being removed. When all the weights are removed, record the return to zero. The scale must return to zero within one-half of a scale division. When analyzing the return to zero, consideration must be given for the length of time the load was on the scale and for possible temperature changes that may have occurred during the test.

64.1.4.6. Acceptance tolerances are applied only to the known test load in the strain load test.

64.1.5. Subsequent Type Evaluation (Field) Permanence Tests

64.1.5.1. A minimum of 40 000 lb of known test weights are needed, or 50 percent of the CLC, whichever is greater.

64.1.5.2. At least one complete set of section tests shall be conducted over each section and at mid-span between each section using the known test weights.

64.1.5.3. At least one strain load test shall be conducted at each end of the scale. The maximum applied load shall be in the range of 65 percent to 100 percent of scale capacity.

64.1.5.4. The time between the initial field performance test and the subsequent field test will be 20-30 days. Performance during both tests must be within acceptance tolerances.

64.1.5.5. If a device fails subsequent permanence tests, the entire permanence test must be repeated.

64.1.6. Caution Regarding Load Concentration

Concentrating large loads on scale platforms by using weight carts or test equipment using hydraulic jacks may exceed the maximum pound per square inch load specification for the deck. This condition may arise because the small tire area of the weight cart in contact with the deck surface could result in a very large load concentration over an unusually small area. This could cause damage to the scale deck.

This situation may occur with a weight cart having a very narrow or short wheel base and small solid rubber tires. This is particularly likely to cause a problem on steel plate decks and could also result in damage to manhole covers. If the load capacities of weight carts are increased beyond 25 000 lb, while maintaining solid tread wheels, it is possible that some concrete decks could be damaged.

64.1.7. Permanence Test Use Requirement For Vehicle Scales

64.1.7.1. A minimum of 300 weighing operations are required during the test period. The manufacturer is to log the date, time, and weight. Each entry is to be initialled by the person conducting the weighing.

64.1.7.2. Only loads which have been applied using a method representative of the scales intended use can be counted.

64.1.7.3. For vehicle scales with a nominal capacity over 75 000 lb:

64.1.7.3.1. 50 percent of the loads must be above 50 000 lb or 80 percent of the CLC, whichever is greater; and

64.1.7.3.2. 100 percent of the loads must be above 20 000 lb or 50 percent of the CLC, whichever is greater.

64.1.7.4. For all other scales:

64.1.7.4.1. 50 percent of the loads must be above 50 percent of the scale capacity; and

64.1.7.4.2. 100 percent of the loads must be above 20 percent of the scale capacity.

64.1.7.5 The minimum number of days that a device is required to be in use is 20. The committee did not specify that certain number of weighing operations needed to be conducted each day for the test period, but recommended that use of the scale be representative of normal in service use.

64.1.7.6. The device will be tested to the CLC on the second test.

64.2. Tests For Double-Wide Vehicle Scales Weighing Elements

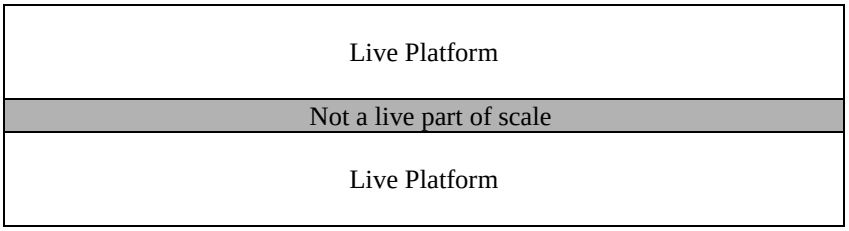
In addition to the testing listed above, tests should be conducted using equipment that closely replicates the actual intended use of the scale. For instance, if the scale is intended to weigh heavy off-road vehicles, several weighments of a loaded off-road vehicle should be conducted in several positions and in both directions on the scale system to establish repeatability.

Multiple pattern loading should be considered in a manner consistent with the intended use.

Examples of Double-Wide or Side- by- Side Vehicle Scales

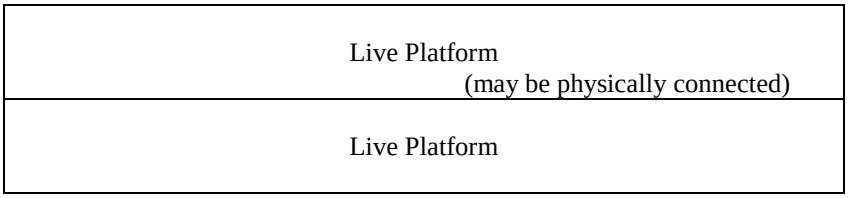
**Example 1**: Side-by-side installation with a dead section located between the two live sections

Each side of the scale system is a complete and independent scale weighing element. If installed with the dead section level with the weighing element this section must be identified as such. It may be a raised curb, and/or be equipped with reflectors or painted a noticeable color to call attention to the center part of the scale.




**Example 2**

The same as example 1 except that there is no divider between the scale platforms.
The two (or more) platforms act as a single platform and are tested as one scale.




64.2.1. Indicator Tests

Beam Scales

If the indicating element is a weighbeam and poise, sensitivity tests should be conducted as follows:

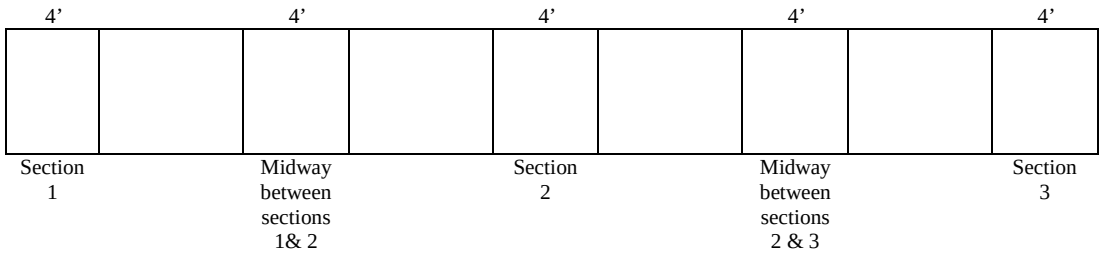
The sensitivity tests are conducted at zero load and at the maximum test load. The sensitivity test is conducted by determining the actual test weight value needed to bring the beam from a rest point at the center of the trig loop to rest points at the top and bottom of the trig loop. The maximum load applied to a scale to determine sensitivity near scale capacity does not have to be a known weight.

Digital Indicator

If the indicating element is a digital indicator, width-of-zero tests, zone of uncertainty tests, and appropriate tests for the automatic zero-setting mechanism (if so equipped) should be conducted as indicated in other sections of this document.

64.2.2. Shift Tests

64.2.3. An example of the four-section scale:




64.2.3.1. At least two complete sets of shift tests shall be conducted over each section on each individual platform to at least 90 percent of the concentrated load capacity (CLC) of the combined scales. When loading the scales do not exceed the CLC capacity for the individual platforms. This is to determine the repeatability of the scale. The scale error should be determined at a minimum of five equally spaced test loads. Scale errors may be determined at more points if desired. If more than one weight cart is used, they should travel along the paths the wheels of a vehicle would take when moving across the scales. Decreasing load tests are to be avoided when testing a section. A truck may not be backed onto the scale in order to place weights on the inner sections. Decreasing load tests shall be conducted after the sections have been tested to their maximum load and the weights are being removed from the scale. The load is to be distributed across the section.

64.2.3.2. At least one complete set of shift tests to at least 90 percent of the CLC of the combined scales shall be conducted at mid-span between sections. When loading the scales do not exceed the CLC capacity for the individual platforms.

64.2.3.3. If a scale consists of modules that are connected together to comprise the weighbridge, shift tests shall be conducted by placing the load so that it straddles the connection between the modules. Later, at least one shift test is to be conducted on the scale with the test load is placed first on one side of the connection line of the module, then on the other side of the connection line.

64.2.3.4. The results of shift tests are required to agree within the absolute value of the applicable maintenance tolerances and must be within acceptance tolerances

64.2.4. Strain Load Test

64.2.4.1. At least one strain load test shall be conducted at each end of the scales. The maximum load applied during the strain load shall be in the range of 80 to 100 percent of scale capacity. The load is to be distributed over each of the individual load receiving elements.

64.2.4.2. Load the scale with a vehicle or vehicles so the addition of test weights will provide a gross load of 80 percent to 100 percent of scale capacity. Determine the “reference point” for the start of the strain load test. Add the test weights to one of the ends of the scales without exceeding the CLC of each individual platform.

64.2.4.3 Do not conduct a decreasing load test or a return to the strain load reference weight as part of this particular strain load test. After removing the test weights from the end of the scale, reestablish the strain load reference value and reapply the test weights to

verify that the strain load values repeat the initial values. Conduct a decreasing load test and return to the strain load reference value as the weights are removed as part of this test cycle. The return to the strain load reference value shall be within one-half of a scale division with consideration given for the creep and for any temperature changes that may have occurred during this last test cycle.

64.2.4.4. Remove the known test weights and the strain load. Zero the scale, place the strain load on the other end of the scale, and establish the strain load reference value. Do not use the zero-setting mechanism to set the strain load to zero; the tare mechanism may be used to tare out the strain load. The gross load zero value is needed to conduct a decreasing load test as the strain load is removed in the next test.

64.2.4.5. Repeat the strain load test on the other end of the scale. After reaching the maximum test load for the strain load test, remove the strain load but leave the known test weights on the scale. The weight indication for the decreasing load test must be within tolerance for the known test load. Continue the decreasing load test by removing the known test weights. Take several readings as the weights are being removed. When all the weights are removed, record the return to zero. The scale must return to zero within one-half of a scale division. When analyzing the return to zero, consideration must be given for the length of time the load was on the scale and for possible temperature changes that may have occurred during the test.

64.2.4.6. Acceptance tolerances are applied only to the known test load in the strain load test.

64.2.5. Subsequent Type Evaluation (Field) Permanence Tests

This criteria applies if:

1) The pattern or model has never been evaluated.
2) The performance indicates that further evaluation is necessary.
3) The design is such that the application of loads near the center of the individual weighing elements affects the weighing operation.

The Subsequent Type Evaluation (Field) Permanence tests may not apply if:

1) The pattern or model has been evaluated previously and it can be demonstrated that the weighing performance is not affected by the different loading pattern.

Test Procedure:

64.2.5.1. A minimum of 40 000 lb of known test weights are needed, or 50 percent of the CLC, whichever is greater.

64.2.5.2. At least one complete set of section tests shall be conducted over each section and at mid-span between each section using the known test weights.

64.2.5.3. At least one strain load test shall be conducted at each end of the scale. The maximum applied load shall be in the range of 65 percent to 100 percent of scale capacity.

64.2.5.4. The time between the initial field performance test and the subsequent field test will be 20-30 days. Performance during both tests must be within acceptance tolerances.

64.2.5.5. If a device fails subsequent permanence tests, the entire permanence test must be repeated.

64.2.6. Caution Regarding Load Concentration

Concentrating large loads on scale platforms by using weight carts or test equipment using hydraulic jacks may exceed the maximum pound per square inch load specification for the deck. This condition may arise because the small tire area of the weight cart in contact with the deck surface could result in a very large load concentration over an unusually small area. This could cause damage to the scale deck.

This situation may occur with a weight cart having a very narrow or short wheel base and small solid rubber tires. This is particularly likely to cause a problem on steel plate decks and could also result in damage to manhole covers. If the load capacities of weight carts are increased beyond 25 000 lb, while maintaining solid tread wheels, it is possible that some concrete decks could be damaged.

64.2.7. Permanence Test Use Requirement For Vehicle Scales

64.2.7.1. Minimum weighment requirement:

1) For scales which operate only in double-wide use a minimum of 300 weighing operations are required during the test period.

2) For scales that can operate in both a single and double-wide use one individual scale must meet the 300 weighments requirement; and, there shall be a minimum of 100 weighments in the double-wide use.

The manufacturer is to log the date, time, and weight. Each entry is to be initialled by the person conducting the weighing.

64.2.7.2. Only loads which have been applied using a method representative of the scales intended use can be counted.

# Appendix A-2 to
# October 1999 Weighing Sector Meeting Summary

TO: Weighing Sector
FROM: Dave Quinn, Fairbanks Scales
DATE: 9/9/99
SUBJECT: Application of CLC Rating

On behalf of Fancor companies, Fairbanks Scale and Thurman Scale, I request the NTEP Weighing Sector review the present test procedures for evaluating the Concentrated Load Capacity (CLC) of a vehicle scale. It would appear that the present procedures used in NTEP evaluation are a misapplication of the CLC definition.

The definition of CLC adopted by NCWM is capacity rating of a vehicle scale, specified by the manufacturer, defining the maximum axle load concentration on a group of 2 axles with a centerline spaced 4' apart and an axle width of 8' for which the weighbridge is designed. This definition is consistent with load concentration used by the Federal Highway Administration in the design of bridge spans to accommodate the axle load configurations of legal highway vehicles, therefore has sound technical basis.

**TEST PATTERNS**

When NCWM discussions opened on the subject of CLC in about 1987 a method of verifying the manufacturers specified design load was a necessary part of the discussion. It ultimately was decided to use a strain load test pattern defined as a minimum of 4' by the width of the scale. This made sense at the time because the normal vehicle scale offered in the market place was 10' - 11' wide. With the maximum vehicle width of 8.5' allowable on U.S. highways there was no reason to believe scales would get wider. This has turned out to be a bad assumption for there are farm vehicles that are as wide a 13' and are used in commercial application. While this application is limited, wider scales were required and were submitted for NTEP approval. At first, these wider vehicle scales were submitted with the same CLC designation as the 10' - 11' versions because the design load for 2 axles on 4' centers did not change. However the NTEP evaluation did change, instead of applying a test load pattern that was 10' - 11' wide the pattern was spread out over the 14' width of the scale resulting in less concentration of load. This in itself was not a problem because the manufacturers CLC designation was the same.

The problem began when manufacturers decided to take advantage of the test pattern and submit wider scales and claiming high CLC. These manufacturers defined CLC as the maximum weight concentration, designated by the manufacturer, that could be place in a test pattern 4' by the width of the scale for NTEP evaluation. In most cases this was clearly not the manufacturers specified design load for 2 axles on 4' centers 8' wide.

Manufacturer "A" recently received a C of C for a line of vehicle scales 14' wide with a CLC rating of 90,000 pounds. The marketing material issued with the product release states the following:

"It is important to understand that the manufacturers set the amount of weights to be used in NTEP testing for their scales, and the total is directly related to the CLC assigned to the scale. The CLC rating resulting from an NTEP test is only a measurement of how well the load cells (and load cell suspensions) react to large loads placed on a scale deck in a 4' x 14' area. --- When a CLC load is applied to the weighbridge during an NTEP test, the NTEP tester records the displayed weight If the scale falls within acceptance testing tolerance, the scale has that CLC weight value recorded as the CLC on the CC." This manufacturer was issued a private brand certificate to manufacture scales covered under a C of C issued to manufacturer "B" making exactly the same claims.

Manufacturer "C" is a spin off of manufacturer "B" and predictably uses exactly the same comments in their release except they raise the ante to a CLC of 100,000 pounds.

Manufacturer "D" states in their product promotion "CLC is defined as a pattern 4' wide across the width of a scale deck. Our models (sic) are available in both 70,000 lb and 110,000 lb Concentrated Load Capacity. CLC is defined as a pattern 4' wide across the width of a scale deck. Their (sic) literature states "Each module is designed for minimal deflection while loaded by a 65,000 lb tandem axle with a 48" spread. Their (sic) price pages state "80.000 lbs tandem axle capacity", and a larger "120,000 lb tandem axle capacity". Using sources to determine

what these comment meant it was determined that "NTEP allowed claiming a CLC that was 5 ton above that approved during test of a specific scale."

It could be assumed that these manufacturers are not well informed on NCWM/NTEP definitions except that the technical support data defines the load carrying capacity of a dual axle as different that 2 axles on 4' centers 8' wide. Manufacturers "A" and "B" specify that the design load for their scale is based on " 45,000 pounds per axle based on the axle pattern of a Euclid R-50" As shown on the attached material a Euclid R-50 has two axles on 12' 3" centers with a width of approximately the same dimension. One can use the H-44 table UR.3.3.1 to calculate the true CLC from this data. If the design is for 2 axles on 12'3" centers instead of the CLC defined 4' centers it is required that the 12'3" dimension be rounded to the next higher whole foot which is 13'. The table indicates an "r" factor of 1.265 for 2 axles in 13'. To determine the CLC based on 4' centers divide the 90,000 pound design load by the "r" factor and the result is 71,000 plus. not 90,000 as claimed on the CC.

Manufacturer "C" raised the dual axle capacity by claiming 50,000 pounds per axle based on the wheel base of a Euclid R-50. Using the same rational divide 100,000 by 1.265 and the result is a true CLC of just below 80,000 pounds.

**Side By Side Scales**

The most recent apparent misapplication of the CLC definition has to do with scales placed side by side for weighing wide "off highway vehicles" such as the Euclid R-50. In one case, a CC was issued to a company that submitted 2 scales with a previously approved CLC of 80,000 pounds. The CC approval rated the resulting scale a double the 80,000 pound CLC or 160,000 pound CLC. This rating would imply that the resulting combination is designed for 160.000 pounds on 2 axles with 4' centers on the same load receiver previously approved for only 80,000 pounds on the 2 axles on 4' centers.

**Conclusions:**

Based on the above it would appear that NTEP evaluations of Vehicle scales are;

1. Not evaluating based on existing definitions in H-44.
2. Are lacking the technical expertise to evaluate the true design criteria of a device based on the H-44 definition.

**Recommendations:**

1. Change the Shift Test Pattern to agree with the definition of CLC. (4' x 8')
2. Require an manufacturer asking for NTEP to submit design calculations from a registered Professional Engineer (PE) substantiating the design load for 2 axles on 4' centered with an 8' width.

If some action is not taken, CLC will become a marketing bullet instead of a useful suitability requirement as intended by NCWM.

# Appendix A-3 to
# October 1999 Weighing Sector Meeting Summary

### Examples of "Double-Wide" Scales

**Example 1**

| | | |
|---|---|---|
| O | O | O |
| O | O | O |

**DEAD SPACE BETWEEN SCALES**

| | | |
|---|---|---|
| O | O | O |
| O | O | O |

(0 = load cell or lever load point)

Each side of the scale is a complete weighing element. The center divider is not part of the weighing element. It must be marked, a raised curb, and or equipped with reflectors or painted to call attention to the area that is not part of the weighing elements.

The scale can be tested in any manner that replicates the actual usage. For example:

Combination highway and extra wide vehicle application would require the scale be tested as

1) two individual scales,
2) a "double-wide" scale using multiple pattern loading, and
3) using two different test loads applied to each section and/or midsection that straddles the two weighing elements. This may require that the tare weight of a test vehicle be determined using the substitution method as the first weight, and test weights be added to the test vehicle as the second test load.

"Extra wide vehicles only" application would require the scale be tested as

1) a "double-wide" scale using multiple pattern loading, and
2) using two different test loads applied to each section and/or midsection that straddles the two weighing elements. This may require that the tare weight of a test vehicle be determined using the substitution method as the first weight, and test weights be added to the test vehicle as the second test load.

**Example 2**

The "double-wide" scale shares the same pit and cannot be used as two individual scales.

| | | |
|---|---|---|
| O O<br>O O | O O<br>O O | O O<br>O O |
| O O<br>O O | O O<br>O O | O O<br>O O |

The scale can be tested in any manner that replicates the actual usage. For example:

Combination highway and extra wide vehicle application would require the scale be tested as

1) a "double-wide" scale using multiple pattern loading,
2) using two different test loads applied to each section and/or midsection that straddles the two weighing elements. This may require that the tare weight of a test vehicle be determined using the substitution method as the first weight, and test weights be added to the test vehicle as the second test load, and
3) using the test vehicle and test load, roll one side of the vehicle on top of seam between the two weighing elements. This will help confirm that there is no binding between the weighing elements.

An "extra wide vehicle" application would require the scale be tested as

1) a "double-wide" scale using multiple pattern loading, and
2) using two different test loads applied to each section and/or midsection that straddles the two weighing elements. This may require that the tare weight of a test vehicle be determined using the substitution method as the first weight, and test weights be added to the test vehicle as the second test load.

**Example 3**

The previous procedures can be applied to modular scales in addition to applying a test load on the right or left side of any connection point or directly on top of a connection point.

| | | |
|---|---|---|
| O O<br>O O | O O<br>O O | O O<br>O O |
| O O<br>O O | O O<br>O O | O O<br>O O |